Wazz' up with Wetlands?

Built your own wetland model using various materials that simulate how wetlands function! Learn about the importance of wetlands, and brainstorm ideas for how you can help!

Summary

Students construct a simple wetland model that demonstrates wetland functions. The first part of the activity students will test different materials and observe how the materials mimic wetland functions. Students will discuss the benefits of wetlands to wildlife and people and examine currents threats to wetland areas. The second part of the activity challenges students to imagine and design a method/model to address one of the threats to wetland areas.

Time

- Please read "Background Info on Wetlands" prior to doing this activity.
- **Part 1**: 45-minutes. Depending on the size of your group, you could construct one group wetland model or several team models (one for each team). Adjust time and materials accordingly. If you did one model, each team could test a different material and all would observe and record.
- **Part 2**: will depend on if you do the projects together as a group or as individual or small group projects to do on their own and share-out later.

Materials

- Modeling clay
- Rolling paint pan (or small aluminum pan)
- Sponges
- Mesh material (orange or onion bags, orsomething similar)
- Pool noodle (or similar material)
- Carpet or Artificial landscaping grass ("Astro Turf" or similar material)
- Other test materials (optional)
- Spray bottle with water
- Watering can or similar device with water
- Extra water for cleaning and filling spray bottles and watering cans
- Cup of soil
- Data Sheet

U.S. Fish & Wildlife Service
National Wildlife Refuge System
San Francisco Bay Wildlife Society
Santa Clara Valley Urban Runoff Pollution Prevention Program

Background Information

A wetland is a place where the land is covered by water, either salt, fresh or a mixture (brackish). Marshes, ponds, the edge of a lake or ocean, the delta at the mouth of a river, low-lying areas that frequently flood are all examples of wetlands. Wetlands typically have three general characteristics: soggy soils, water-loving plants and water. Scientists call these: hydric soils, hydrophytic vegetation, and wetland hydrology.

Wetland habitats serve essential functions in an ecosystem, including acting as water filters, providing flood and erosion control, and furnishing food and homes for fish and wildlife. They do more than sustain plants and animals in the watershed, however. Many wetlands are not wet year-round because water levels change with the seasons. During periods of excessive rain, wetlands absorb and slow floodwaters, which helps to alleviate property damage and may even save lives. Wetlands also absorb excess nutrients, sediments, and other pollutants before they reach rivers, lakes, and other waterbodies. They are also great spots for fishing, canoeing, hiking, and bird-watching, and are enjoyable outdoor "classrooms" for people of all ages.

Reference

Adapted from: https://oceanservice.noaa.gov/facts/wetland.html

Part 1: Build a Model Wetland

Procedure

- Review what you have learned about wetlands and their functions (refer to previous activities and background information)
- Explain that you will make a wetland model to demonstrate some of these functions in a very simplified way.
  - Spread a layer of modeling the clay along the short half of the pan to represent land. Leave the other half empty to represent water (the San Francisco Bay or your own local body of water).
  - Shape the clay so that it gradually slopes down to the water (this is easier if you use a paint tray as it is already sloped).
  - Smooth the clay along the sides of the pan so that it seals the edges. Make sure the clay fits the pan well, so that there are no spaces under or between the sides of the pan.
  - You can form streams in the clay if you want to include that feature.

- Test and observe what happens when you make it "rain" on the land.
    - Using the spray bottle, slowly spray some rain on land (the clay). Observe and record your observations. Now use the watering can to represent more rain. Slowly sprinkle more rain on the land. Observe and record your observations.

- **Guiding questions**: When you made it rain on the model, what happened to the rainwater? (Rain flowed downhill directly to the Bay). Did you notice a difference in what happened when you used the spray bottle versus the watering can? What were the differences?
    - Sprinkle a layer of soil over the clay. Explain that this demonstration will be just like the first, except that topsoil will cover the clay.
    - Use the spray bottle and then the watering can to make it rain over the soil. Observe and record your observations.

- **Guiding questions**: What happened to the soil when it rained? (The rain picked up and carried some sediment over the land and into the body of water).
    - Rinse off the soil from the model.

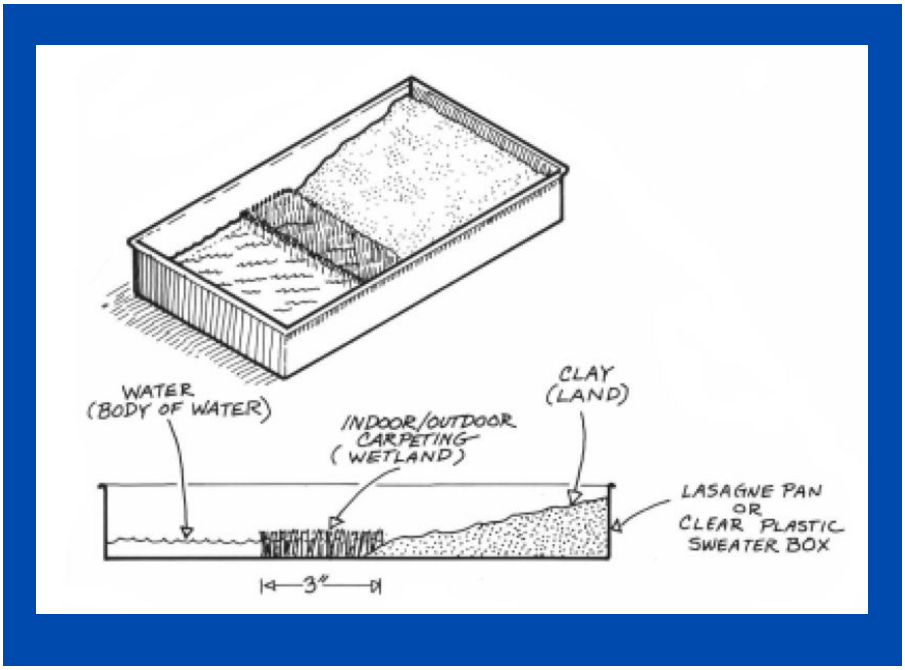
- Explain that wetlands, like all habitats, are complicated natural systems. They perform some very important functions such as water filtration, storm protection, buffering, flood control, and preventing soil erosion. Wetlands also provide food and homes for fish and wildlife. Some wetlands can store and recharge groundwater supplies. Now you will test the different "wetland" types and observe how these materials mimic the functions of wetlands. Record your observations on your data sheet.
    - Fit the piece of carpeting or landscaping grass into the wetland area along the edge of the clay. Using the watering can, slowly sprinkle some rain on land (clay). Observe and record your observations.

- **Guiding questions**: What happened to the rainwater when you used the carpeting or landscape grass? (The wetland/carpeting slowed the rate of flow, and the excess rain slowly entered the Bay. The wetland absorbed some of the water).
    - With the carpet or grass still in place, sprinkle some soil on the land and test with some rain. Observe and record your observations.

- **Guiding questions:** What happened to the soil when it rained? (The rain should pick up and carry some sediment over the land and into the body of water, but some of the soil will collect on the carpet or lawn). Besides soil, what other things could wash into the Bay? (trash, pollution from urban runoff).
    - Which wetland function might this material represent? (It could represent a Buffer)

- Remove the carpet or landscaping grass and test the other materials in the same manner. Rinse out the Bay each time so you have a clean test area. Observe and record your findings on the data sheet. What wetland functions did the other materials represent? (Possibilities include: Sponge=storage; mesh=filter/water quality; pool noodle=barrier/flood control)

- What other materials could you use to test? How would these materials represent wetland functions?



Discuss the Results

- Share-out observations and results. Use the guiding questions to facilitate the discussion.
- Explain that most wetlands are shallow basins. They collect water, slow the rate of flow of the water and can retain water for a time. This slowing process helps reduce flooding and helps prevent soil erosion.
- Guiding questions: Sometimes wetlands are filled in, and houses are built in its place. What might happen to the houses during a severe rainstorm? Why? (The houses might be flooded because the wetland will not be there to absorb and slow the rush of water from higher ground). What other things can happen as a result of removing or altering wetlands? Read about and discuss the threats to wetlands.

Reference

Activity adapted from "A Wetland in a Pan: from WOW! The Wonder of Wetlands, Project WET, Environmental Concern, Inc, 1995.

Part 2: Threats and Solutions

What are some threats to wetlands? Read & Discuss.

What happens to the area if a wetland is removed or destroyed? Human activity is probably the biggest cause of wetland destruction or degradation. Development -- whether it's drainage, damming to form lakes or ponds, adding pavement, or diverting water flow -- affects the soil's hydrologic condition, or the presence of water in the soil. In many areas, wetlands are drained and filled, and houses and marinas are built right along the water. Without a wetland buffer, these developed areas, particularly along the coast, are often subjected to severe flooding and erosion, especially during violent storms.

Humans can't take all the blame, though. There also are natural threats to wetlands, such as droughts. Even though wetlands are sponge-like and can hold water in reserve for a long time, they can't do it forever. Some wetlands will eventually dry out if they aren't replenished. Wildlife can also be a detriment. Overgrazing by animals can cut down on the area's vegetation, leaving wetlands susceptible to erosion. Natural disasters like hurricanes or flooding can greatly erode a wetland area. While wetlands act as a buffer against these weather occurrences, they also pay the price with diminished vegetation and pollution from runoff.

Pollution also degrades wetlands and water quality. It can contribute to declines in natural resources and food sources. Again, wetlands act as a natural filter for polluted water, but they can only absorb so much. Pollution enters the water table through pesticides, sediment, sewage, fertilizers and many other forms. Once a wetland is polluted, it's difficult to clean it up. The best way to keep wetlands clean is to protect them from pollution in the first place, by ensuring contaminant-free water and food supply.

Global warming is also a threat to wetlands. As air temperatures rise, so do water temperatures. Because warmer waters are more productive, wetlands may end up overrun by algae, which degrades water quality and poses health problems¬ to humans and animals. The algae bloom known as red tide releases toxins, which have killed thousands of fish. Eating affected shellfish can expose humans to these toxins. Breathing the air near a red tide can also cause respiratory issues in some people. Many fish rely on cooler water to survive and can die out when smaller lakes or ponds warm up. Elevated temperatures can also lead to reduced precipitation, which reduces the amount of runoff provided to wetlands.

Remember that wetlands also provide many recreational activities such as bird watching, fishing and wildlife viewing. People would lose these opportunities if wetlands are altered too much.

Reference

Adapted from: https://science.howstuffworks.com/environmental/green-science/wetland3.htm

Solutions

After reading about the threats to wetlands (and to local and migratory species), can you think of a solution to address a threat? Can you design a model to demonstrate your solution?

List your threat and design your solution.

- Decrease of natural resources and food sources; development/habitat loss; decline in quality of drinking water; urban runoff/pollution/trash; flooding; change in water flow; introduction of invasive species; loss of biodiversity; impacts on recreation such as swimming and fishing; change in aesthetics/loss of open space; change in community economy; climate change.

Share-out your Threat and Solution!

Here are some cool projects that kids have done to address a threat to wetlands or areas around wetlands. Check them out for ideas and inspiration.

Stow-It Don't Throw It

Sean Russell. (Photo courtesy of Stow It Don't Throw It)

Sean Russell of North Port, Florida. Growing up near the ocean, Sean was interested in protecting marine environments. At 16, he created the Stow It-Don't Throw It Project, an effort to combat the negative impact of marine debris on marine wildlife, especially discarded fishing line and gear. Through his project, Russell and fellow volunteers repurpose tennis ball containers into fishing line recycling bins and distribute them to anglers while educating them about the importance of proper disposal of lines. Stow It-Don't Throw It now has partner organizations in 10 states. Sean also leads the Youth Ocean Conservation Summit to help other kids learn how to launch their own conservation projects.
https://www.treehugger.com/young-inventors-who-may-just-save-the-world-4868617

Home Elevation System

This home elevation system would provide a way for a home to rise above water level in flood prone areas. Hurricanes and flooding are common in Florida and many parts of the world. Some homes are already built on stilts, but often not high enough to protect the home from a flood. This system works with telescoping stilts so that when the flood waters reached a certain level, protecting the home and occupants from flood damage and displacement.

The ingenious part of this invention is the telescope stilts. The telescopic principle has not as far as we know been applied to protecting houses in the event of floods, but is regularly used in other constructions and engineering projects. As in many of the other children's inventions, their naivety allows them to propose unusual solutions that may prove very valuable. Visit https://www.designathon.nl/ to learn more!

Observation & Data Sheet

	Spray Bottle	Watering Can	Soil	Wetland Function
Original Wetland				
Wetland with Carpet/Lawn				
Wetland with Mesh				
Wetland with Sponge				
Wetland with Pool Noodle				